AgriLIFE EXTENSION
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BEETLE - MANIA

BIOLOGICAL CONTROL OF SALTCEDAR IN TEXAS

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The saltcedar leaf beetle feeds only on saltcedar and athel, a closely related species that grows along the Rio Grande River in Texas.

If saltcedar or athel trees are not present, the larvae starve to death.

Saltcedar beetles were first established in Texas in 2004 at Big Spring, TX. Since then, there have been no reports of beetles or larvae feeding on any other plant. except saltcedar and its close relative athel (Tamarix aphylla).

Beetles Face Wet Summer and Cold Winter Extremes During 2010-2011

Wet Summer. In general, saltcedar beetle populations at Big Spring and surrounding counties did not increase or disperse in 2010 as rapidly as they did in 2009. One likely explanation is the prolonged rainfall the area received in late June through early July of last year. This is because the pupal stage of the beetle occurs on the ground for 5-6 days, is immobile and can not escape flooded areas. Pupae are therefore susceptible to drowning when low lying areas flood. Remnants of Hurricane Alex brought heavy rainfall into the West Texas area in late June. From June 29 through July 9, rainfall occurred on 8 of these 11 days at Big Spring, TX and totaled 3.34 inches. If a large portion of the beetle population was in the pupal stage at this time, which is likely, these pupae could have drown during this prolonged period of rain. This unusual rainfall may have resulted in an overall decline in beetle populations observed at many sites. The total rainfall during April through August, 2010, at Big Spring was 9 inches, compared to 5 inches in 2009, a year in which beetle populations greatly increased and dispersed. Rain is always welcome in west Texas, but it may be detrimental to saltcedar leaf beetles if it occurs when many beetles are in the risky pupal stage.

Cold Winter. Record low temperatures and prolonged cold extended over west Texas during the first week in February. Low temperatures were in the single digits as far south as Fort Stockton and high temperatures were below freezing for 2-4 consecutive days in many areas.

Saltcedar leaf beetles overwinter as adults sheltered under leaf litter, in clumps of grass and cracks in the soil. Like many insects, leaf beetles enter a state of hibernation called diapause and survive on stored fat during the winter. The chemistry of their blood changes to allow them to survive below-freezing temperatures. Thus, beetles are expected to have survived the past cold winter as well as in previous winters. Beetles are already active this spring. Tunisian beetles were reported on saltcedar trees on February 17 in Big Bend National Park. Crete beetles were reported on saltcedar trees the last week of March near Amarillo.

Pupae of the saltcedar leaf beetle. Full grown larvae move to the ground and transform to the immobile pupa. Some pupae are covered with bits of dead leaves while other pupae are naked. The pupa transforms into the adult beetle after 5-6 days.

Larvae of the saltcedar leaf beetle feeds on saltcedar leaves and tender bark. Larvae feed for about 12-14 days during the summer. Full grown larvae are about 1/3 inch long. Several generations are completed per year.

Saltcedar Beetles Established in 12 Texas Counties in 2010.

At the close of 2010, the Texas AgriLife Biological Control Implementation Program had released saltcedar leaf beetles at 23 sites in 16 counties in west Texas. Leaf beetle populations were established at 12 of these sites and in 2010 defoliated as estimated 500 acres of saltcedar.

Beetles are considered established if they survive the winter and increase the following spring to numbers sufficient to defoliate trees. To-date, established populations are present in the Colorado River Basin (Martin, Mitchell, Borden and Tom Green Counties), the Red River Basin (King County), the Brazos River Basin (Crosby County), and in the Pecos/Rio Grande River Basin (Pecos, Reeves and Brewster Counties).

In 2010, this project collected 354,000 Crete beetles, primarily from the Big Spring/Colorado City area but also from the Pecos River site, for release at new sites. Also, 47,000 Tunisian beetles were collected from near Presidio, TX and released at new locations on the Pecos River. In previous years, very large numbers of beetles were collected in August-September in the Big Spring area. However, in 2010, as discussed earlier, beetle populations were so low that despite repeated searches, few beetles could be found after August 4 and additional collection of beetles was not possible.

In 2009, the project collected and released 300,000 beetles, bringing the 2009-2010 total to over 700,000 beetles.

Beetles are collected by hand with a "beat-bucket" a 5 gallon bucket with a funnel at the bottom. Branches are shaken into the bucket and the beetles are funneled into a collection jar. Beetles are transferred to paper bags, held in coolers, refrigerated and usually released at a new site within 24 hrs. And no, we do not count every beetle.

A good day of beetle collecting. Allen Knutson, Nathan Leamons and Manuel Campos. Texas AgriLife Extension, collecting saltcedar leaf beetles near Colorado City, TX. August, 2010.

How Much Water Does Saltcedar Use ?

The U.S. Geological Survey USGS recently reviewed the scientific studies measuring water use by saltcedar and factors that influence the amount of water that can be saved, or salvaged, by large-scale saltcedar removal. This review shows that there is no single answer to the question "how much water does saltcedar use."

Early studies using saltcedar grown in small tanks overestimated water use. Claims that a single saltcedar plant could consume as much as 200 gallons of water per day arose from these early studies. More recent research shows that it is physically impossible for a saltcedar tree to consume 200 gallons/day.

Plants release water into the air through tiny pores in their leaves. This process is evapotranspiration or ET. The rate of ET varies by plant species. Plant size and density influence the amount of water used by a species across a landscape.

Current methods can now measure the ET above large stands (acres) of saltcedar under natural conditions. These methods estimate an average ET for saltcedar of 0.75-1.45 meters of water per year, with a mean rate of about one meter per year for dense stands of saltcedar. Studies on the Pecos and Rio Grande Rivers in Texas estimated ET of 0.75 meters per year by measuring sap flow in individual trees.

Of course, plants that replace saltcedar also use water for ET and therefore influence the amount of water that might be saved by saltcedar removal. ET rates by likely replacement vegetation are shown in the table. These values are from sites across the southwest and vary according to local site characteristics.

Water savings as a result of saltcedar removal can be achieved if the replacement vegetation or ground cover uses less water than the saltcedar it replaced and if the amount of water saved can be measured as increased groundwater storage or increased stream flow.

A 2009 study on the Pecos River in Texas estimated saltcedar ET at 0.42-1.18 m per year. After the saltcedar was treated with herbicide, seasonal water salvage ranged from 82% two years after treatment to 31% four years after treatment. This study concluded that this water salvage will be short-lived if saltcedar regrowth is not controlled. Leaf beetles are now feeding on this regrowth on the Pecos River and should help extend the benefit of the herbicide program.

The USGS report, titled "Saltcedar and Russian Olive Control Demonstration Act Science Assessment" 2010, USGS Report 2009-5247 is available online at: http://bc4weeds.tamu.edu/

Vegetation or cover	ET Estimate, meters/year
Saltcedar	0.6-3.4
Mesquite	0.4-0.7
Saltcedar and mesquite	1.6
Seepwillow (Baccharis)	0.8
Cottonwood-willow	0.5-1.0
Sacaton grass	0.55
Annual weeds, grasses, bare soil	0.6-0.7
Bare soil	0.3
Open Water Evaporation	1.2

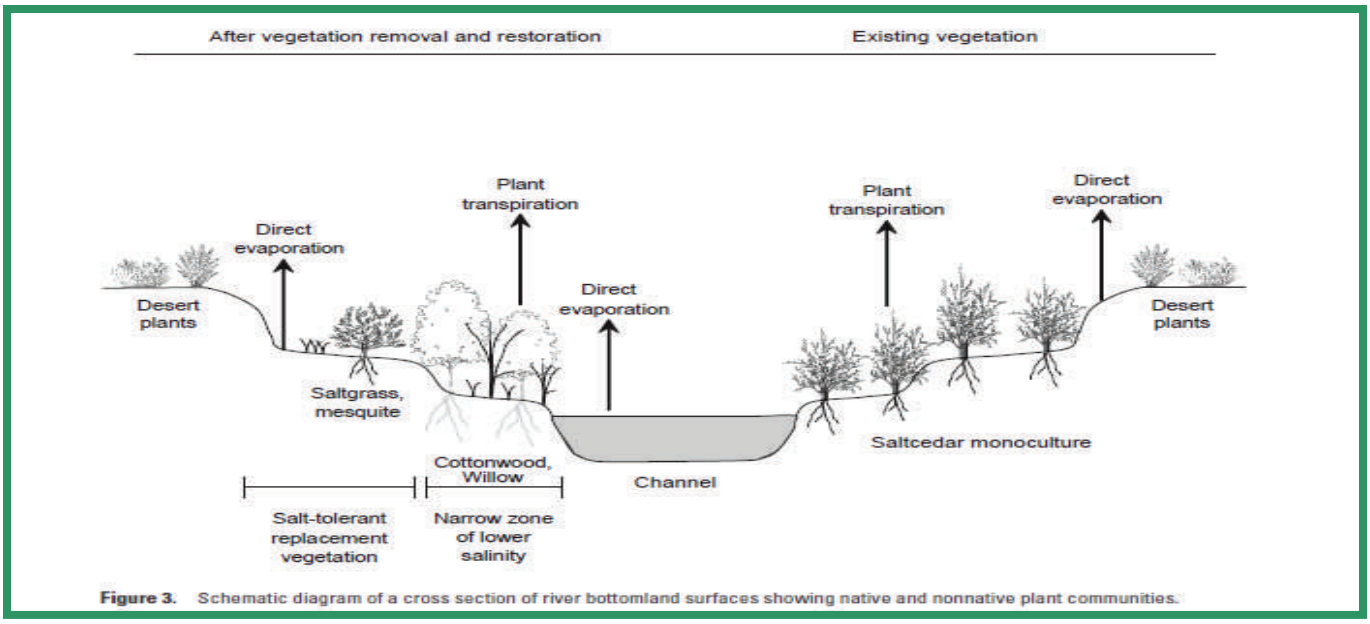

Figure 3. Schematic diagram of a cross section of river bottomland surfaces showing native and nonnative plant communities.

Diagram shows how saltcedar can grow both along the stream bank and on drier upland sites with mesquite and saltgrass and therefore compete for groundwater across a wide area. From USGS Report 2009-5247

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BEETLE-MANIA is a newsletter on biological control of saltcedar in Texas, and is written and produced by Allen Knutson, Texas AgriLife Extension. To be included on the mailing list, please contact Allen Knutson.

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For more information on biological control of saltcedar and other invasive weeds in Texas, go on-line at: **bc4weeds.tamu.edu**.